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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,768	05/07/2007	Robert D'Alessandro	290162US0PCT	8287

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ALEXANDRIA, VA 22314

EXAMINER

NGUYEN, HUY TRAM

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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12/22/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/576,768	Applicant(s) D'ALESSANDRO ET AL.	
	Examiner HUY-TRAM NGUYEN	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-51, 56 and 57 is/are rejected.
- 7) ☒ Claim(s) 52-55 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Remarks, filed on September 18, 2009, with respect to the rejection(s) of claim(s) 1-41 under 102(b) and/or 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of **Carr (US Patent No. 5,169,516) in view of Gore (US Patent No. 6,274,785 B1).**

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 42-47 and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Gore (US Patent No. 6,274,785 B1) in view of Carr (US Patent No. 5,169,516)**

Regarding Claim 42, Gore reference discloses a process for reducing the concentration of organosulfur compounds in a hydrocarbon-based fluid, comprising contacting said hydrocarbon-based fluid with a first oxidant in a first reactor to obtain a first reactor effluent **(Figure 1, High sulfur product Feed, Oxidant Feed)**.

Gore also discloses said first and second oxidant comprise a peroxy-carboxylic acid obtained by reacting a carboxylic acid with hydrogen peroxide **(Column 5, Lines 56-58 and Column 7, Line 66-Column 8, Line 5)**.

However, Gore references does not disclose the process step of contacting a second liquid comprising at least one hydrocarbon obtained from the first reactor with a second oxidant in a second reactor.

Carr reference discloses a process for reducing the concentration of organosulfur compounds in a hydrocarbon-based fluid **(mercaptan as organosulfur compounds)**, comprising

contacting said hydrocarbon-based fluid with a first oxidant in a first reactor to obtain a first reactor effluent (**Column 12, Lines 28-39 and Figure, numerals 10-hydrocarbon feed, 12- air as first oxidant, 18- first oxidizer and 20 - first reactor effluent**) and

contacting a second liquid comprising at least one hydrocarbon with a second oxidant in a second reactor to obtain a second reactor effluent (**Column 12, Lines 37-47 and Figure, numeral 22- air as second oxidant, 28 – second oxidizer and 34 – second reactor effluent**), wherein

a) said second liquid comprises said first reactor effluent (**Figure, numeral 34 – second reactor effluent**) or is obtained from said first reactor effluent by phase separation as a first light phase,

c) said hydrocarbon fluid has a concentration of unoxidized organosulfur compounds that is greater than the concentration of unoxidized organosulfur compounds in said second liquid (**Column 12, Lines 37-40 – 90 percent or more of its mercaptan sulfur removed from the first oxidizer effluent stream**).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore et al. with the oxidizing steps as taught by Carr, since Carr states at **Abstract** that such a modification would successfully remove mercaptan and non mercaptan sulfur compounds from the hydrocarbon stream.

Regarding Claim 43, Gore and Carr references disclose the process of claim 42, wherein the ratio of the total oxidant concentration in the first oxidant to the total oxidant

concentration in the second oxidant is less than or equal to 1 (**Carr- inherency – less sulfur compounds in the second oxidizer**).

Regarding Claim 44, Gore and Carr references disclose the process of claim 42 except for said second liquid is obtained from said first reactor effluent by phase separation as a first light phase. Gore discloses the process in which the first effluent being sent to an aqueous nonaqueous separator to obtain the heavy phase of the oxidant to recycle back to the oxidizer and the light phase of the hydrocarbon to the next step. It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore et al. combined with Carr with the claimed second liquid so that further organosulfur being successfully removed from the hydrocarbon stream.

Regarding Claim 45, Gore and Carr references disclose the process of claim 44 except for said first oxidant is obtained from said second reactor effluent by phase separation as a second heavy phase. Gore discloses the process in which the first effluent being sent to an aqueous nonaqueous separator to obtain the heavy phase of the oxidant to recycle back to the oxidizer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore et al. combined with Carr with the claimed first oxidant which is obtained from a second heavy phase of a phase separation of the second reactor effluent since Gore discloses the process in which the first effluent being sent to an aqueous nonaqueous separator to obtain the heavy phase of the oxidant to recycle back to the oxidizer (**Figure 1**) since it would have been a matter of design choice.

Regarding Claim 46, Gore and Carr references disclose the process of claim 42 except for comprises contacting a third liquid, obtained from said second reactor effluent by phase separation as a second light phase, with a third oxidant in a third reactor.

Carr reference discloses an oxidation process comprising two oxidizers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore with a third the oxidizing step, since Carr states at **Abstract** that such a modification would successfully remove mercaptan and non mercaptan sulfur compounds from the hydrocarbon stream.

Gore discloses the process in which the oxidization reaction effluent being sent to an aqueous nonaqueous separator to obtain the heavy phase of the oxidant to recycle back to the oxidizer and the light phase of the hydrocarbon to the next step. It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore combined with Carr with the claimed third liquid from the light phase of the phase separation of the second reactor effluent so that further organosulfur being successfully removed from the hydrocarbon stream.

Regarding Claim 47, Gore and Carr references disclose the process of claim 42 except for the hydrocarbon-based fluid is a middle distillate distilling from about 65.6°C to about 385°C. Gore reference the first liquid comprising the petroleum distillates. It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Gore and Carr with the claimed middle distillate since it has been held to be within the general skill of a worker in the art to select a

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known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding Claim 56, Gore and Carr et al. references disclose the process of claim 42, wherein said peroxydicarboxylic acid is peroxyacetic acid and said carboxylic acid is acetic acid (**Gore - Column 5, Lines 56-58 and Column 7, Line 66-Column 8, Line 5 – inherency use acetic acid to prepared the oxidizing agent of peroxyacetic acid**).

Regarding Claim 57, Gore et al. and Carr et al. references disclose the process of claim 56, further comprising a step of reacting acetic acid with hydrogen peroxide to form peroxyacetic acid in an additional reactor and feeding the resulting mixture to said second reactor (**Gore - Column 7, Line 66-Column 8, Line 5 and Carr- Figure, numeral 22 – air as second oxidant to second reactor**).

5. Claims 48-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Gore (US Patent No. 6,274,785 B1) in view of Carr (US Patent No. 5,169,516) and Gore et al. (US Patent No. 6,596,914 B2)**

Regarding Claim 48, Gore and Carr references disclose the process of claim 47 including the solvent extraction step and raffinate wash step (**Figure 3, DMSO extract unit and water extract unit**). However, Gore and Carr references do not disclose the steps of extracting the second light phase in an extraction step with the carboxylic acid used to form the peroxydicarboxylic acid to obtain a first raffinate and a first extract, said first raffinate is contacted in a raffinate wash step with an aqueous solution to obtain a washed raffinate and an aqueous extract and said washed raffinate is contacted with an

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adsorbent material to obtain a product fuel. Gore et al. reference discloses these solvent extraction step with the solvent being acetic acid and raffinate wash step with water and a polishing step with an adsorbent material **(Figure 2, numeral 27 – extraction, 35-raffinate solvent recovery and 40- raffinate polishing absorber and Column 8, Line 38-Column 10, Line 27)**.

Regarding Claim 49, Gore, Carr and Gore et al. reference disclose the process of claim 48, wherein said extraction step is carried out in an extraction column **(Gore et al. - Figure 2, numeral 27)**.

Regarding Claim 50, Gore, Carr and Gore et al. references disclose the process of claim 48, wherein said raffinate wash step is carried out in a raffinate wash column **(Gore et al. - Figure 2, numeral 35)**.

Regarding Claim 51, Gore, Carr and Gore et al. references disclose the process of claim 48, wherein said first extract is separated in a solvent recovery step into a recovered carboxylic acid and an extract depleted of carboxylic acid and part of the recovered carboxylic acid is recycled to the extraction step **(Gore – Figure 3, extract separator and Gore et al. – Figure 2, numeral 7 and Column 11, Lines 8-11)**.

Allowable Subject Matter

6. Claims 52-55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Regarding Claim 52, Gore, Carr and Gore et al. references disclose the process of claim 51 except for the extract depleted of carboxylic acid is distilled in a hydrocarbon recovery step to obtain a recovered hydrocarbon and an extract byproduct because the recovered liquid of Gore et al. process does not contain hydrocarbons when being introduced to the solvent purification distillation column since the hydrocarbons containing in the bottoms fraction which is recycled to the oxidation process step with solvent (Gore et al. – Column 11, Lines 23-35)

Claims 53-55 directly depend on Claim 52.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY-TRAM NGUYEN whose telephone number is (571)270-3167. The examiner can normally be reached on MON- THURS: 6:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HTN

12/16/09

/Walter D. Griffin/

Supervisory Patent Examiner, Art Unit 1797